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The Circulation and Sleep. By JOHN F. SHEPARD. University of Michigan Studies, Scientific Series, Vol. I. New York, The Macmillan Co., 1914. ix + 82 pp., with Atlas of 63 charts (82 figures).

From a study of the literature, Dr. Shepard believes that it is impossible to draw any definite conclusion as to an anaemia or hyperaemia during sleep. He studies various questions, then, making use of two trephined subjects,—one, an intelligent laborer, and the other, a senior at the University of Michigan. The book contains a valuable criticism of methods and a careful description of various appliances which Dr. Shepard had to devise or adapt in order to suit his purposes. In all, over 700 graphic records, amounting to 3,500 feet, were taken and this alone gives the study an authoritative basis. The brain volume, volume of the periphery, chest and abdominal breathing, blood pressure, heart rate, time of transmission of the pulse wave over the body, jugular pulse, and the size and form of the pulse were studied. "All of these were studied, not only singly and during ordinary sleep, but in combination and under various conditions designed to show the causes of the reactions found." Very great care was employed to eliminate from the records all extraneous influences,—the elimination of the influence of the movements of the scalp and voluntary muscles being especially noteworthy.

The results show that with the oncome of sleep, no matter how quickly nor what the position of the subject, the volume of the brain was markedly increased, the increase being from 0.3 to 0.7 cu. cm. There is also, in general, an increase in the size of the arterial pulse from the brain, accompanying the increase in volume with sleep. "Throughout the period of sleep, the volume of the brain remains higher than in the waking condition." Waking, on the other hand, brings a reverse of the circulatory changes,—volumetric and the like,—brought about by going to sleep. No definite correlation was found between the curve of the depth of sleep and the brain volume, except that the greatest volume occurs soon after the subject goes to sleep and as a rule disappears within 15 to 25 minutes. "During the greater part of sleep, the brain curve is at a level a little below this extreme." The results show that there is no definite reciprocal relation between the volume of the periphery (hand and foot) and that of the brain. With the oncoming of sleep, the breathing decreases in amplitude of the abdominal movements, with a relative increase in chest breathing. Various types of breathing were noted in sleep. There are also characteristic changes in the Traube-Hering wave during sleep. The blood pressure is 8-10 mm. lower during sleep than during the waking condition. In one subject, there was found to be a negative relation between the blood pressure and the rise and fall of the Traube-Hering wave; the opposite relations held for the other subject.

From a consideration of these results and many others which we cannot enumerate in this review, Dr. Shepard comes to the conclusion that there may be effective activity of cerebral vaso-motors under normal conditions. He is most emphatic on this point. "I do not see how we can avoid the conclusion that the brain vessels are not inactive, that they do not follow passively the changes in general arterial and venous pressure but that, on the contrary, they are under the quite definite control of a system of vaso-motor constrictors, and the center of this control is probably a portion of the general constrictor center in the medulla." "We reach the conclusion, then, that the brain

vessels relax on going to sleep and constrict on awakening with relatively great activity."

As a result of this conclusion, Dr. Shepard believes that we must definitively abandon an anaemia theory of sleep. Dr. Shepard notes other reasons for this:—1. there is an increase of brain volume to stimuli while the subject is awake and they certainly show no tendency to cause sleep; 2. there is definite evidence that the circulation change lags behind the mental processes. Hence the circulatory changes on going to sleep and on awakening should be looked upon as effect rather than cause. Dr. Shepard then advances, instead of an anaemia theory of sleep, one in which he considers sleep and sleeplessness as mental processes. "Sleep is promoted by the situation in which we have really become accustomed to sleep." "Sleep is controlled by conditions similar to those which control attention generally. Sleep and sleeplessness are mental processes." "As we go to sleep, then, we become absorbed in a mass or complex of fatigue sensations. These tend strongly to inhibit other processes, especially motor activity and consciousness of strain sensations in the muscles."

This study of Dr. Shepard's shows, in the first place, exceedingly great care in experimentation; and secondly, great conservatism in the interpretation of his records. The author seems definitely to have made his point of overthrowing the anaemia theories of sleep. His constructive work is, however, less convincing. His theory appears to be merely a carrying further of some of the auto-suggestion theories of sleep which have been in the literature for some years. However, whether one accepts the author's theoretical interpretations or not, one must grant that Dr. Shepard's book makes a valuable contribution to the literature of this topic. The charts are very well reproduced, very numerous and well selected and are of great help to the reader.

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BOOK NOTES

Das Interesse der Schulkinder an den Unterrichtsfächern. Von GEORG BRANDELL. Leipzig, J. A. Barth, 1915. 168 p.

This is essentially a study of the feeling value of the topics of instruction, a report of which of them are loved and unloved, beginning with the lowest classes, comparing always results obtained by similar studies elsewhere. There is special reference to children's relative fondness for theoretical and practical departments. Children's judgments in regard to usefulness of different departments and the reason why they like or dislike them are interesting and significant. A special rubric is the desire of children to go farther in the different topics. The latter part of the report is devoted to fifteen special topics, one after another.